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Publication Title:

**CONTINUOUS WASHING AND TRANSFER OF ARTICLES TO A CLEAN ROOM**

Abstract:

A method and installation for effecting continuous washing and transfer of articles e.g. bottles to a clean room, comprising the steps of: conveying the articles continuously on a conveyor means extending within enclosure means and into a clean room, and within the enclosure means sequentially subjecting the articles to a bactericidal wash and to bactericidal radiation.

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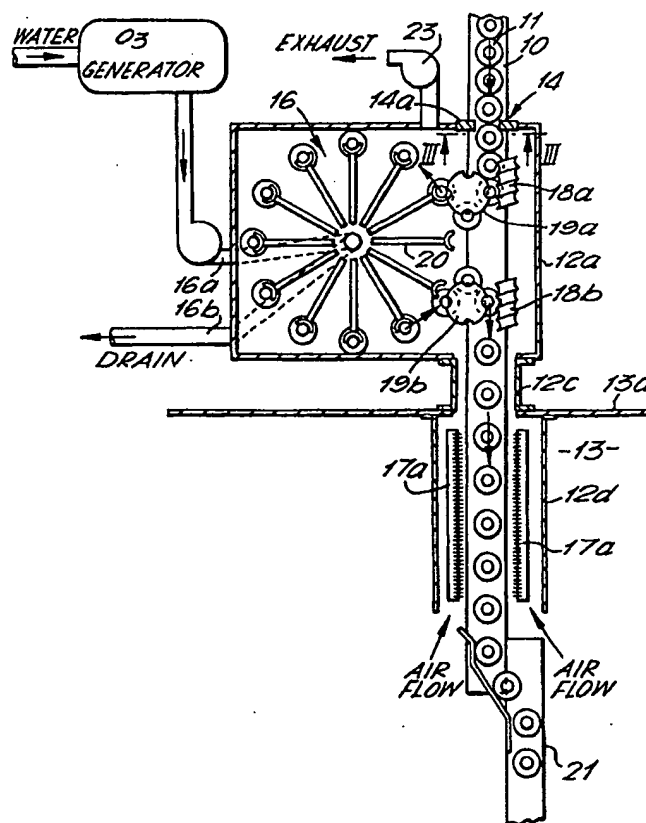


## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<b>(21) International Application Number:</b> PCT/GB94/02316 <b>(22) International Filing Date:</b> 21 October 1994 (21.10.94) <b>(30) Priority Data:</b> 9321993.9 26 October 1993 (26.10.93) GB <b>(71) Applicant (for all designated States except US):</b> GLE-NEAGLES SPRING WATERS COMPANY LIMITED [GB/GB]; The Maltings, Moray Street, Blackford, Perthshire PH4 1QF (GB). <b>(72) Inventor; and</b> <b>(75) Inventor/Applicant (for US only):</b> NEILLE, Graeme, Kennedy [GB/GB]; 26 Poplar Crescent, Perthshire PH1 1HR (GB). <b>(74) Agent:</b> FRANK B. DEHN & CO.; European Patent Attorneys, Imperial House, 15-19 Kingsway, London WC2B 6UZ (GB).		<b>(81) Designated States:</b> AM, AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, JP, KE, KG, KP, KR, KZ, LK, LR, LT, LU, LV, MD, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SI, SK, TJ, TT, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG), ARIPO patent (KE, MW, SD, SZ).  <b>Published</b> <i>With international search report.</i> <i>Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>

**(54) Title:** CONTINUOUS WASHING AND TRANSFER OF ARTICLES TO A CLEAN ROOM**(57) Abstract**

A method and installation for effecting continuous washing and transfer of articles e.g. bottles to a clean room, comprising the steps of: conveying the articles continuously on a conveyor means extending within enclosure means and into a clean room, and within the enclosure means sequentially subjecting the articles to a bactericidal wash and to bactericidal radiation.



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CONTINUOUS WASHING AND TRANSFER OF  
ARTICLES TO A CLEAN ROOM

This invention relates to a method for effecting  
5 continuous washing and transfer of articles to a clean  
room, and to an installation for use in carrying out  
such method.

The invention is concerned particularly, but not  
exclusively, with articles in the form of bottles  
10 intended to be charged with liquid for human  
consumption, for example, mineral water.

In this description, the term "clean room" means a  
room-like enclosure associated with a supply of clean  
air introduced to maintain a pressure in the clean room  
15 slightly greater than ambient atmospheric pressure for  
the purpose of inhibiting the entry into the clean room  
of air-borne contaminants of any kind. Clean rooms are  
known per se and their construction is not a feature of  
the present invention.

20 Although the use of clean rooms in the bottling  
industry is fairly recent, clean rooms are commonly used  
in the pharmaceutical industry. The number of  
operations which can be carried out inside the clean  
room is, however, very limited. In fact, the only  
25 operation generally carried out in the clean room is the  
actual filling. Other processes, such as washing the  
containers, applying labels, etc are carried out outside  
the clean room.

Normally in the pharmaceutical industry, the  
30 containers to be filled are treated and sterilized in  
batches on the way to the clean room. In a commonly  
used system, the containers are loaded from outside into  
a box-type chamber where they are washed and sterilized,  
usually by heat. The sterilized containers are then

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conveyed out of the chamber and then into a clean room for filling.

Although this method is sufficient for pharmaceutical products, where the number of containers is relatively small, the batch-wise transfer process is too slow and inefficient for use in the food and drink bottling industry where the number of bottles to be processed is very large.

Recently, clean rooms have come to be used in the bottling industry. To speed up the process, some systems are arranged to carry out more operations actually within the clean room, such as washing and/or rinsing. This, however, has the disadvantage of introducing contaminants into the clean room.

Other systems use a step-wise process to convey bottles into a washing or rinsing machine and then the rinsed bottles are conveyed out of the rinsing machine and into the clean room. Again, this has the problem of introducing contaminated bottles into the clean room.

According to the present invention, there is provided a method for effecting continuous washing and transfer of articles to a clean room, comprising the steps of:

conveying the articles continuously on a conveyor means extending within enclosure means and into a clean room, and

within the enclosure means sequentially subjecting the articles to a bactericidal wash and to bactericidal radiation.

Preferably, the said method includes the step of inducing an exhaust current from the enclosure means to ensure a continuous air flow therethrough from the clean room.

Preferably, the articles are bottles intended to be charged with mineral water and the bactericidal wash

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is water and ozone and the bactericidal radiation is ultraviolet radiation.

Further, according to the present invention, there is provided an installation for use in the continuous washing and transfer of articles to a clean room,  
5 comprising:

a continuous conveyor for conveying the articles and extending within enclosure means and into a clean room, an exit from the enclosure means being within the  
10 clean room,

a washing means for use in washing the articles and disposed within the enclosure means adjacent an entrance thereto, and

an irradiating means operable to emit bactericidal radiation towards the conveyor and articles thereon and  
15 disposed within the enclosure means downstream of the washing means.

Preferably, there is provided a venting means adjacent the entrance to the enclosure means, being  
20 operable to induce an exhaust current from the enclosure means.

Preferably, the enclosure means comprises a cabinet housing the washing means and a duct connecting the interior of the cabinet with the interior of the  
25 clean room.

Preferably, the washing means comprises a rotary bottle-washing mechanism.

Preferably, the irradiating means comprises ultraviolet lamps.

30 Preferably, the irradiating means produces heat.

Also, in a preferred embodiment, the bottles are supported, during transfer, by a pair of guide rails above the conveyor, which support the necks of the bottles to prevent light plastic bottles from falling.

Embodiments of the present invention will now be described, by way of example, with reference to the accompanying drawings in which:-

Fig. 1 is a diagrammatic plan view of an  
5 installation for the washing and transfer to a clean room of bottles, all in accordance with the present invention;

Fig. 2 is a diagrammatic plan view similar to Fig. 1, but showing additional constructional features and  
10 modifications; and

Fig. 3 is a sectional elevation on the line III-III in Fig. 2 to a larger scale than Fig. 2.

In Fig. 1 of the drawings, the installation comprises a continuous conveyor 10 for carrying articles  
15 in the form of bottles 11 and extending within an enclosure means 12 and into a clean room 13. The enclosure means 12 has an entrance indicated by reference numeral 14 and an exit indicated by reference numeral 15 and disposed within the clean room 13.

20 The enclosure means 12 consists of a cabinet portion 12a which houses a bottle-rinsing mechanism 16 which is disposed adjacent the entrance 14; and the enclosure means 12 further consists of a duct 12b within which is arranged an irradiating means in the form of a  
25 bank or banks of ultraviolet lamps 17.

The clean room 13 is bounded by a wall of which a portion is indicated by reference numeral 13a; and it will be understood that the duct 12b passes through the wall portion 13a in such a manner that an air-tight seal  
30 is effected between the duct 12b and the wall 13a.

The bottle-rinsing mechanism 16 is operable to rinse and drain the insides of the bottles; and the mechanism is supplied with water incorporating a bactericidal agent, e.g. ozone, by means of a supply

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pipe 16a. The rinsing mechanism is drained by means of a drain pipe 16b.

Operation of the above described installation is as follows. The clean room internal air pressure is maintained above ambient pressure in a known manner sufficient to induce an outward air flow through the duct 12b and cabinet 12a. Bottles 11 carried inwards on the continuous conveyor 10 are first subjected to a bactericidal wash by means of the rinsing mechanism 16. On emerging from the rinsing mechanism cabinet 12a, the bottles on the conveyor 10 enter the duct 12b and are subjected to bactericidal radiation from the ultraviolet lamps 17. Thus, the exterior surfaces of the bottles 11 are substantially disinfected as is the inward moving run of the conveyor 10.

The bottles 11 may be supported as they are conveyed along the conveyor 10 by a pair of guide rails (not shown) extending along the conveyor 10 and above it. This rails hold the necks of the bottles 11 to prevent light plastic bottles from falling.

Heat, which is also produced by the lamps 17, assists in vaporising water droplets remaining on the bottles 11 from the previous wash treatment; and an ozone-rich environment is created within the duct 12b and the cabinet 12a which is continuously exhausted at the entrance 14 due to the higher pressure within the clean room 12.

In a modification of the installation described above, a venting means (not shown in Fig. 1) is incorporated in the cabinet 12a adjacent the entrance 14 and operable to induce a positive exhaust current from the enclosure means to ensure a continuous air flow therethrough from the clean room 13. The venting means (not shown in Fig. 1) is preferably an exhaust fan or an exhaust impeller.



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The installation described above provides a means for the continuous washing and transfer of bottles into the clean room and accomplishes improved production rates compared with installations hitherto proposed.

5 In Figs. 2 and 3 of the drawings, parts corresponding with those in Fig. 1 are given the reference numerals used in Fig. 1. In Fig. 2, the entrance 14 is provided with a replaceable insert 14a having an aperture configured to match the outline of a  
10 bottle 11 as is shown in Fig. 3. This arrangement reduces the opportunity for contaminant dust particles and the like to enter the cabinet 12a at the entrance 14.

In Fig. 2, the rinsing mechanism 16 is a rotary  
15 mechanism known per se. Bottles 11 entering the cabinet 12a on the conveyor 10 are engaged regularly by a feeder worm 18a and carried by a first transfer wheel 19a to an array of radial arms 20 which, whilst turning anti-clockwise, sequentially invert the bottles 11 over spray  
20 heads (not shown) for washing and then re-invert the bottles for return to the conveyor 10 by way of a second transfer wheel 19b and feed worm 18b.

The cabinet 12a is free-standing adjacent the clean room wall 13a except that the cabinet 12a is  
25 linked to an aperture in the wall 13a by means of a first duct 12c.

Within the clean room 13 a second duct 12d encloses the inner end portion of the conveyor 10 and also mutually-opposed banks of ultraviolet lamps 17a.

30 In this embodiment, the conveyor 10 returns at about the inner end of the duct 12d (that is, the exit from the enclosure means defined by the cabinet 12a, duct 12c and duct 12d); and a bottle deflector or "scroll" 22 moves the bottles onto a continuous conveyor  
35 21 leading to a bottle-filling station (not shown).

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The cabinet 12a is provided with venting means in the form of an exhaust fan 23 which is operable adjustably to ensure a continuous and substantially even air-flow from the clean room 13.

5           Generally, the operation of the Fig. 2/Fig. 3 embodiment is as described with reference to Fig. 1.

CLAIMS

1. A method for effecting continuous washing and transfer of articles to a clean room, comprising the  
5 steps of:  
conveying the articles continuously on a conveyor means extending within enclosure means and into a clean room, and  
within the enclosure means sequentially subjecting  
10 the articles to a bactericidal wash and to bactericidal radiation.
2. The method of claim 1, further including the step of inducing an exhaust current from the enclosure means  
15 to ensure a continuous air flow there through from the clean room.
3. The method of claim 1 or 2 wherein the articles are bottles intended to be charged with mineral water.  
20
4. The method of any preceding claim wherein said bactericidal wash comprises water and ozone.
5. The method of any preceding claim wherein said  
25 bactericidal radiation is ultraviolet radiation.
6. Apparatus for the continuous washing and transfer of articles to a clean room, comprising:  
a continuous conveyor for conveying the articles  
30 and extending within enclosure means and into a clean room, an exit from the enclosure means being within the clean room,  
a washing means for use in washing the articles and disposed within the enclosure means adjacent an  
35 entrance thereto, and

an irradiating means operable to emit bactericidal radiation towards the conveyor and articles thereon and disposed within the enclosure means downstream of the washing means.

5

7. The apparatus of claim 6 further comprising venting means adjacent the entrance to the enclosure means, being operable to induce an exhaust current from the enclosure means.

10

8. The apparatus of claims 6 or 7 wherein the enclosure means comprises a cabinet housing the washing means and a duct connecting the interior of the cabinet with the interior of the clean room.

15

9. The apparatus of claim 6, 7 or 8 wherein the washing means comprises a rotary bottle-washing mechanism.

20

10. The apparatus of any of claims 6 to 9, wherein the irradiating means comprises ultraviolet lamps.

11. The apparatus of any of claims 6 to 10, wherein the irradiating means produces heat.

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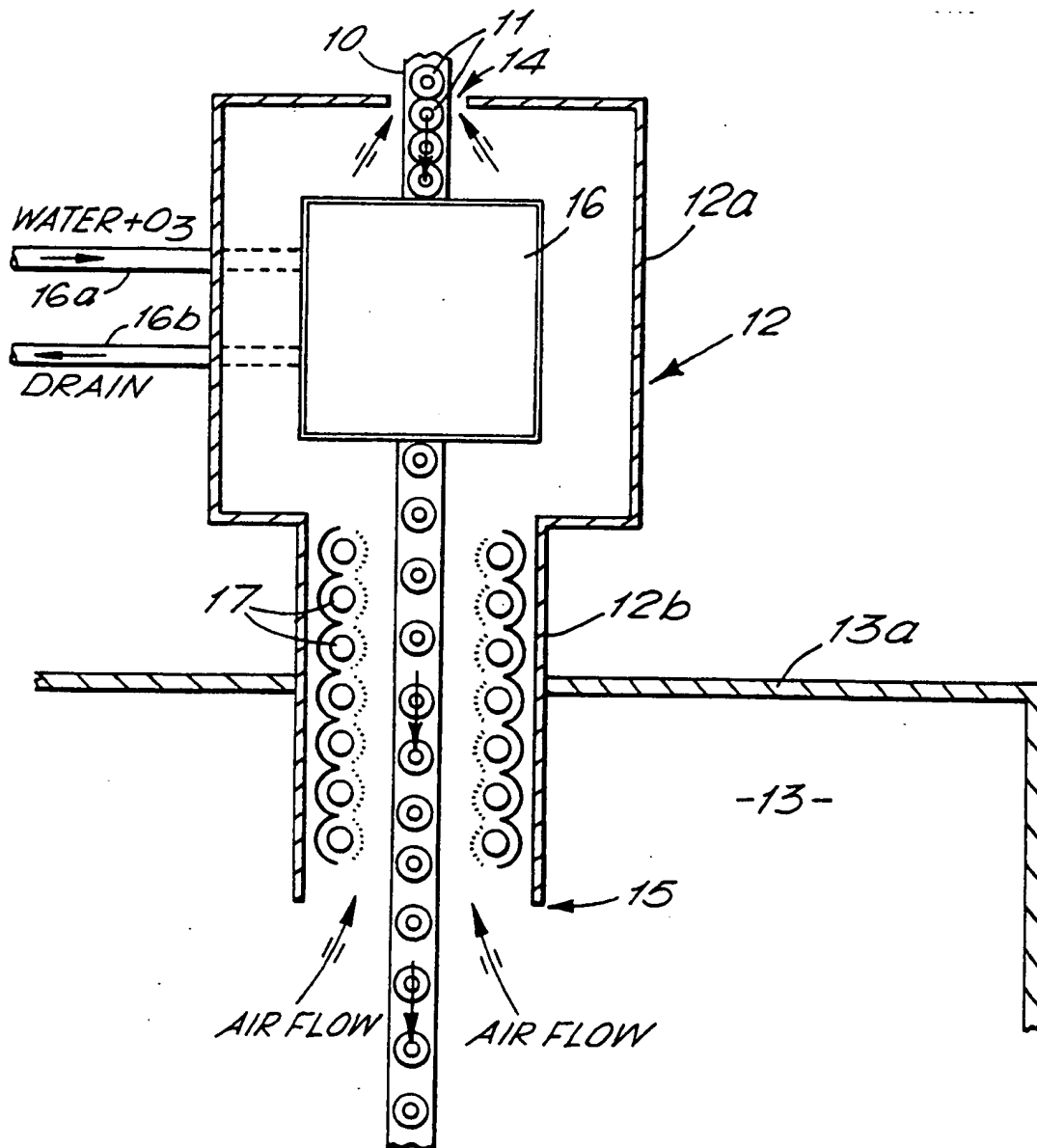


FIG.1.

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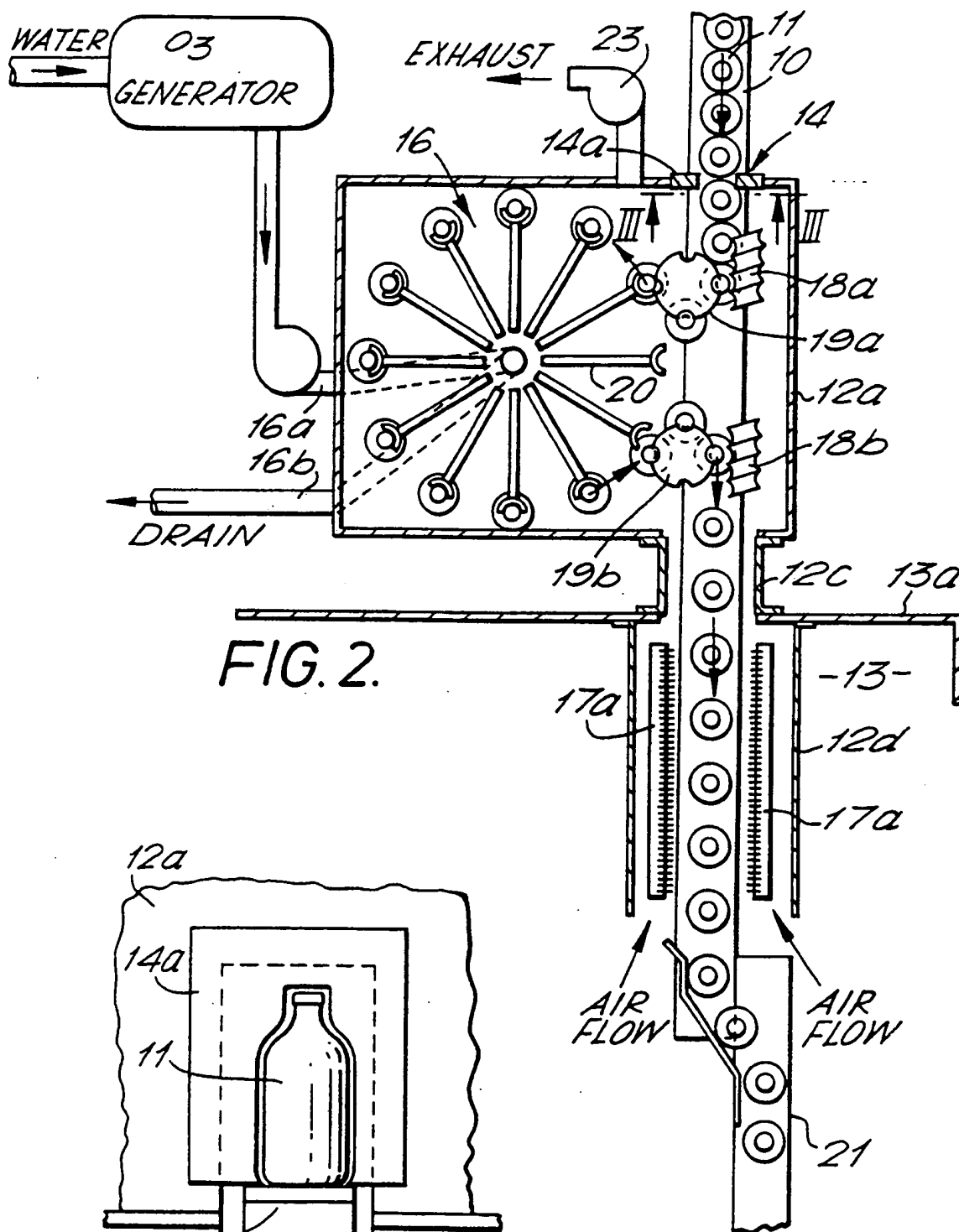
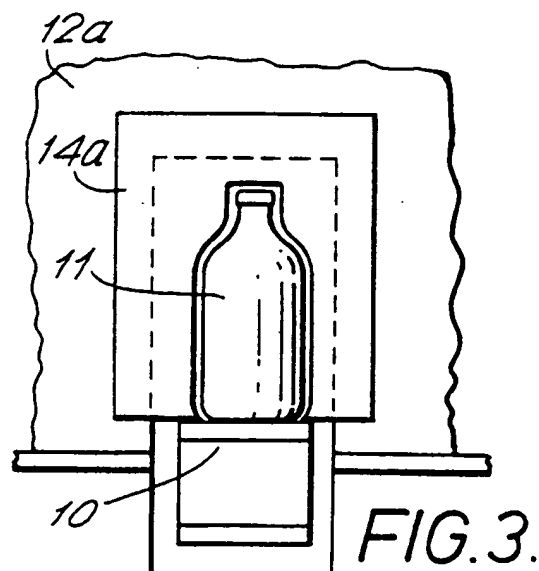
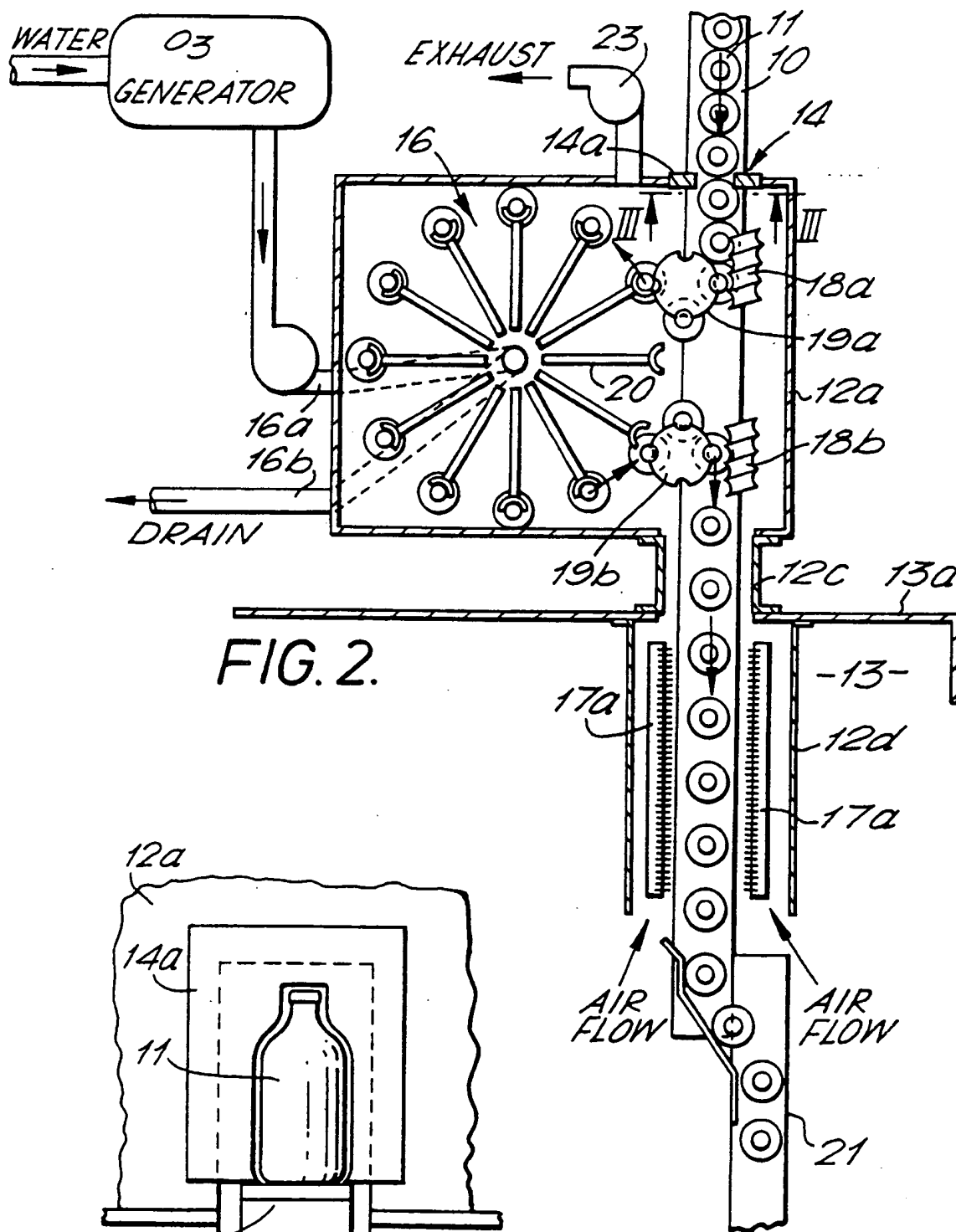


FIG. 2.

FIG. 3.

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## INTERNATIONAL SEARCH REPORT

Intern: al Application No

PCT/GB 94/02316

A. CLASSIFICATION OF SUBJECT MATTER  
 IPC 6 B08B9/20 B67C 5/10

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 B67C B65B B08B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	---	6,7,9,10
X	PATENT ABSTRACTS OF JAPAN vol. 14, no. 327 (M-998) 13 July 1990 & JP,A,02 109 836 (TOPPAN PRINTING CO LTD) 23 April 1990 see abstract	1,5,6,10
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☒ Further documents are listed in the continuation of box C.

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Date of the actual completion of the international search

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Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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